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## THE GEOGRAPHICAL PIVOT OF HISTORY.\*

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WHEN historians in the remote future come to look back on the group of centuries through which we are now passing, and see them foreshortened, as we to-day see the Egyptian dynasties, it may well be that they will describe the last 400 years as the Columbian epoch, and will say that it ended soon after the year 1900. Of late it has been a commonplace to speak of geographical exploration as nearly over, and it is recognized that geography must be diverted to the purpose of intensive survey and philosophic synthesis. In 400 years the outline of the map of the world has been completed with approximate accuracy, and even in the polar regions the voyages of Nansen and Scott have very narrowly reduced the last possibility of dramatic discoveries. But the opening of the twentieth century is appropriate as the end of a great historic epoch, not merely on account of this achievement, great though it be. The missionary, the conqueror, the farmer, the miner, and, of late, the engineer, have followed so closely in the traveller's footsteps that the world, in its remoter borders, has hardly been revealed before we must chronicle its virtually complete political appropriation. In Europe, North America, South America, Africa, and Australasia there is scarcely a region left for the pegging out of a claim of ownership, unless as the result of a war between civilized or half-civilized powers. Even in Asia we are probably witnessing the last moves of the game first played by the horsemen of Yermak the Cossack and the shipmen of Vasco da Gama. Broadly speaking, we may contrast the Columbian epoch with the age which preceded it, by describing its essential

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characteristic as the expansion of Europe against almost negligible resistances, whereas mediæval Christendom was pent into a narrow region and threatened by external barbarism. From the present time forth, in the post-Columbian age, we shall again have to deal with a closed political system, and none the less that it will be one of world-wide scope. Every explosion of social forces, instead of being dissipated in a surrounding circuit of unknown space and barbaric chaos, will be sharply re-echoed from the far side of the globe, and weak elements in the political and economic organism of the world will be shattered in consequence. There is a vast difference of effect in the fall of a shell into an earthwork and its fall amid the closed spaces and rigid structures of a great building or ship. Probably some half-consciousness of this fact is at last diverting much of the attention of statesmen in all parts of the world from territorial expansion to the struggle for relative efficiency.

It appears to me, therefore, that in the present decade we are for the first time in a position to attempt, with some degree of completeness, a correlation between the larger geographical and the larger historical generalizations. For the first time we can perceive something of the real proportion of features and events on the stage of the whole world, and may seek a formula which shall express certain aspects, at any rate, of geographical causation in universal history. If we are fortunate, that formula should have a practical value as setting into perspective some of the competing forces in current international politics. The familiar phrase about the westward march of empire is an empirical and fragmentary attempt of the kind. I propose this evening describing those physical features of the world which I believe to have been most coercive of human action, and presenting some of the chief phases of history as organically connected with them, even in the ages when they were unknown to geography. My aim will not be to discuss the influence of this or that kind of feature, or yet to make a study in regional geography, but rather to exhibit human history as part of the life of the world organism. I recognize that I can only arrive at one aspect of the truth, and I have no wish to stray into excessive materialism. Man and not nature initiates, but nature in large measure controls. My concern is with the general physical control, rather than the causes of universal history. It is obvious that only a first approximation to truth can be hoped for. I shall be humble to my critics.

The late Prof. Freeman held that the only history which counts is that of the Mediterranean and European races. In a sense, of course, this is true, for it is among these races that have originated the ideas which have rendered the inheritors of Greece and Rome dominant throughout the world. In another and very important sense, however, such a limitation has a cramping effect upon thought. The ideas which go to form a nation, as opposed to a mere crowd of human animals,

have usually been accepted under the pressure of a common tribulation, and under a common necessity of resistance to external force. The idea of England was beaten into the Heptarchy by Danish and Norman conquerors; the idea of France was forced upon competing Franks, Goths, and Romans by the Huns at Chalons, and in the Hundred Years' War with England; the idea of Christendom was born of the Roman persecutions, and matured by the Crusades; the idea of the United States was accepted, and local colonial patriotism sunk, only in the long War of Independence; the idea of the German Empire was reluctantly adopted in South Germany only after a struggle against France in comradeship with North Germany. What I may describe as the literary conception of history, by concentrating attention upon ideas and upon the civilization which is their outcome, is apt to lose sight of the more elemental movements whose pressure is commonly the exciting cause of the efforts in which great ideas are nourished. A repellent personality performs a valuable social function in uniting his enemies, and it was under the pressure of external barbarism that Europe achieved her civilization. I ask you, therefore, for a moment to look upon Europe and European history as subordinate to Asia and Asiatic history, for European civilization is, in a very real sense, the outcome of the secular struggle against Asiatic invasion.

The most remarkable contrast in the political map of modern Europe is that presented by the vast area of Russia occupying half the Continent and the group of smaller territories tenanted by the Western Powers. From a physical point of view, there is, of course, a like contrast between the unbroken lowland of the east and the rich complex of mountains and valleys, islands and peninsulas, which together form the remainder of this part of the world. At first sight it would appear that in these familiar facts we have a correlation between natural environment and political organization so obvious as hardly to be worthy of description, especially when we note that throughout the Russian plain a cold winter is opposed to a hot summer, and the conditions of human existence thus rendered additionally uniform. Yet a series of historical maps, such as that contained in the Oxford Atlas, will reveal the fact that not merely is the rough coincidence of European Russia with the Eastern Plain of Europe a matter of the last hundred years or so, but that in all earlier time there was persistent re-assertion of quite another tendency in the political grouping. Two groups of states usually divided the country into northern and southern political systems. The fact is that the orographical map does not express the particular physical contrast which has until very lately controlled human movement and settlement in Russia. When the screen of winter snow fades northward off the vast face of the plain, it is followed by rains whose maximum occurs in May and June beside the Black sea, but near the Baltic and White

seas is deferred to July and August. In the south the later summer is a period of drought. As a consequence of this climatic régime, the north and north-west were forest broken only by marshes, whereas the south and south-east were a boundless grassy steppe, with trees only along the rivers. The line separating the two regions ran diagonally north-eastward from the northern end of the Carpathians

Fig. 1



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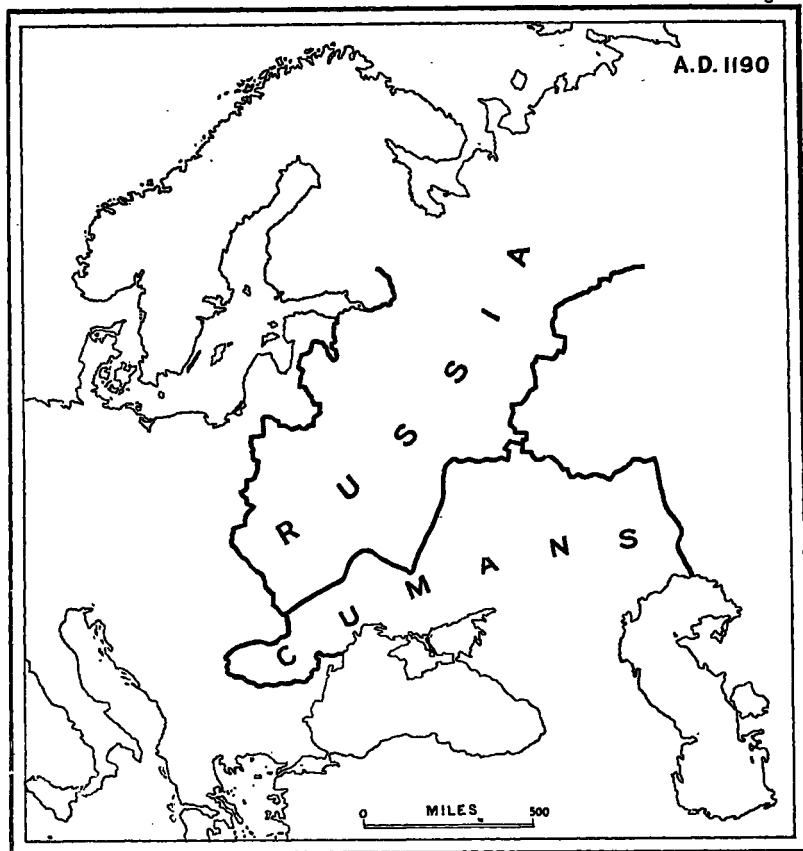
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**EASTERN EUROPE BEFORE THE 19TH CENTURY,**  
(AFTER DRUDE IN BERGHAUS' PHYSICAL ATLAS)

to a point in the Ural range nearer to its southern than to its northern extremity. Moscow lies a little to north of this line, or, in other words, on the forest side of it. Outside Russia the boundary of the great forest ran westward almost exactly through the centre of the European isthmus, which is 800 miles across between the Baltic and the Black seas. Beyond this, in Peninsular Europe, the woods spread on through the plains of Germany in the north, while the steppe lands in the south

turned the great Transylvanian bastion of the Carpathians, and extended up the Danube, through what are now the cornfields of Roumania, to the Iron Gates. A detached area of steppes, known locally as Pusttas, now largely cultivated, occupied the plain of Hungary, ingirt by the forested rim of Carpathian and Alpine mountains. In all the west of Russia, save in the far north, the clearing of the forests, the drainage of

Fig. 2



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**POLITICAL DIVISIONS OF EASTERN EUROPE**  
**AT THE TIME OF THE 3<sup>RD</sup> CRUSADE,**  
 (AFTER THE OXFORD HISTORICAL ATLAS.)

the marshes, and the tillage of the steppes have recently averaged the character of the landscape, and in large measure obliterated a distinction which was formerly very coercive of humanity.

The earlier Russia and Poland were established wholly in the glades of the forest. Through the steppe on the other hand there came from the unknown recesses of Asia, by the gateway between the Ural mountains and the Caspian sea, in all the centuries from the fifth to the

sixteenth, a remarkable succession of Turanian nomadic peoples—Huns, Avars, Bulgarians, Magyars, Khazars, Patzinaks, Cumans, Mongols, Kalmuks. Under Attila the Huns established themselves in the midst of the Pusstas, in the uttermost Danubian outlier of the steppes, and thence dealt blows northward, westward, and southward against the settled peoples of Europe. A large part of modern



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**POLITICAL DIVISIONS OF EASTERN EUROPE  
AT THE ACCESSION OF CHARLES V.  
(AFTER THE OXFORD HISTORICAL ATLAS)**

history might be written as a commentary upon the changes directly or indirectly ensuing from these raids. The Angles and Saxons, it is quite possible, were then driven to cross the seas to found England in Britain. The Franks, the Goths, and the Roman provincials were compelled, for the first time, to stand shoulder to shoulder on the battlefield of Chalons, making common cause against the Asiatics, who were unconsciously welding together modern France. Venice

was founded from the destruction of Aquileia and Padua; and even the Papacy owed a decisive prestige to the successful mediation of Pope Leo with Attila at Milan. Such was the harvest of results produced by a cloud of ruthless and idealess horsemen sweeping over the unimpeded plain—a blow, as it were, from the great Asiatic hammer striking freely through the vacant space. The Huns were followed by the Avars. It was for a marchland against these that Austria was founded, and Vienna fortified, as the result of the campaigns of Charlemagne. The Magyar came next, and by incessant raiding from his steppe base in Hungary increased the significance of the Austrian outpost, so drawing the political focus of Germany eastward to the margin of the realm. The Bulgarian established a ruling caste south of the Danube, and has left his name upon the map, although his language has yielded to that of his Slavonic subjects. Perhaps the longest and most effective occupation of the Russian steppe proper was that of the Khazars, who were contemporaries of the great Saracen movement: the Arab geographers knew the Caspian as the Khazar sea. In the end, however, new hordes arrived from Mongolia, and for two centuries Russia in the northern forest was held tributary to the Mongol Khans of Kipchak, or “the Steppe,” and Russian development was thus delayed and biassed at a time when the remainder of Europe was rapidly advancing.

It should be noted that the rivers running from the Forest to the Black and Caspian seas cross the whole breadth of the steppe-land path of the nomads, and that from time to time there were transient movements along their courses at right angles to the movement of the horsemen. Thus the missionaries of Greek Christianity ascended the Dnieper to Kief, just as beforehand the Norse Varangians had descended the same river on their way to Constantinople. Still earlier, the Teutonic Goths appear for a moment upon the Dniester, having crossed Europe from the shores of the Baltic in the same south-eastward direction. But these are passing episodes which do not invalidate the broader generalization. For a thousand years a series of horse-riding peoples emerged from Asia through the broad interval between the Ural mountains and the Caspian sea, rode through the open spaces of southern Russia, and struck home into Hungary in the very heart of the European peninsula, shaping by the necessity of opposing them the history of each of the great peoples around—the Russians, the Germans, the French, the Italians, and the Byzantine Greeks. That they stimulated healthy and powerful reaction, instead of crushing opposition under a widespread despotism, was due to the fact that the mobility of their power was conditioned by the steppes, and necessarily ceased in the surrounding forests and mountains.

A rival mobility of power was that of the Vikings in their boats. Descending from Scandinavia both upon the northern and the southern

shores of Europe, they penetrated inland by the river ways. But the scope of their action was limited, for, broadly speaking, their power was effective only in the neighbourhood of the water. Thus the settled peoples of Europe lay gripped between two pressures—that of the Asiatic nomads from the east, and on the other three sides that of the pirates from the sea. From its very nature neither pressure was overwhelming, and both therefore were stimulative. It is noteworthy that the formative influence of the Scandinavians was second only in significance to that of the nomads, for under their attack both England and France made long moves towards unity, while the unity of Italy was broken by them. In earlier times, Rome had mobilized the power of her settled peoples by means of her roads, but the Roman roads had fallen into decay, and were not replaced until the eighteenth century.

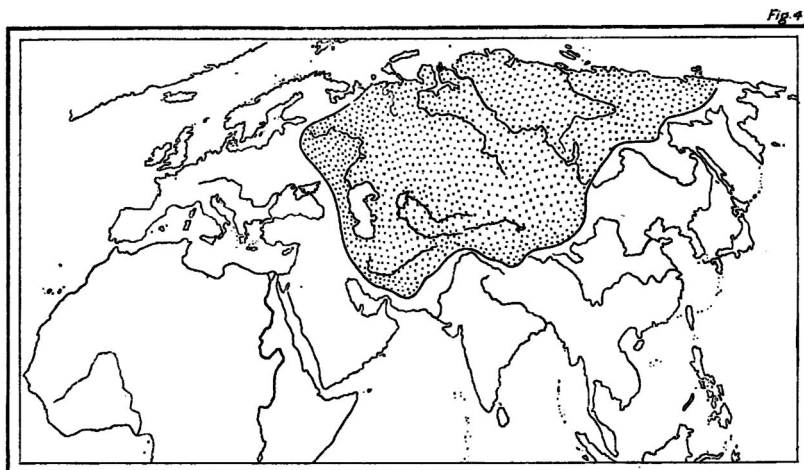
It is likely that even the Hunnish invasion was by no means the first of the Asiatic series. The Scythians of the Homeric and Herodotian accounts, drinking the milk of mares, obviously practised the same arts of life, and were probably of the same race as the later inhabitants of the steppe. The Celtic element in the river-names *Don*, *Donetz*, *Dneiper*, *Dneister*, and *Danube* may possibly betoken the passage of peoples of similar habits, though not of identical race, but it is not unlikely that the Celts came merely from the northern forests, like the Goths and Varangians of a later time. The great wedge of population, however, which the anthropologists characterize as Brachy-Cephalic, driven westward from Brachy-Cephalic Asia through Central Europe into France, is apparently intrusive between the northern, western, and southern Dolicho-Cephalic populations, and may very probably have been derived from Asia.\*

The full meaning of Asiatic influence upon Europe is not, however, discernible until we come to the Mongol invasions of the fifteenth century; but before we analyze the essential facts concerning these, it is desirable to shift our geographical view-point from Europe, so that we may consider the Old World in its entirety. It is obvious that, since the rainfall is derived from the sea, the heart of the greatest land-mass is likely to be relatively dry. We are not, therefore, surprised to find that two-thirds of all the world's population is concentrated in relatively small areas along the margins of the great continent—in Europe, beside the Atlantic ocean; in the Indies and China, beside the Indian and Pacific oceans. A vast belt of almost uninhabited, because practically rainless, land extends as the Sahara completely across Northern Africa into Arabia. Central and Southern Africa were almost as completely severed from Europe and Asia throughout the greater part of history as were the Americas and Australia. In fact, the southern boundary of Europe was and is the Sahara rather than the

\* See 'The Races of Europe,' by Prof. W. Z. Ripley (Kegan Paul, 1900).



Mediterranean, for it is the desert which divides the black man from the white. The continuous land-mass of Euro-Asia thus included between the ocean and the desert measures 21,000,000 square miles, or half of all the land on the globe, if we exclude from reckoning the deserts of Sahara and Arabia. There are many detached deserts scattered through Asia, from Syria and Persia north-eastward to Manchuria, but no such continuous vacancy as to be comparable with the Sahara. On the other hand, Euro-Asia is characterized by a very remarkable distribution of river drainage. Throughout an immense portion of the centre and north, the rivers have been practically useless for purposes of human communication with the outer world. The Volga, the Oxus, and the Jaxartes drain into salt lakes; the Obi, the Yenesei, and the Lena into the frozen ocean of the north. These are six of the



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### CONTINENTAL AND ARCTIC DRAINAGE



EQUAL AREA PROJECTION

greatest rivers in the world. There are many smaller but still considerable streams in the same area, such as the Tarim and the Helmund, which similarly fail to reach the ocean. Thus the core of Euro-Asia, although mottled with desert patches, is on the whole a steppe-land supplying a wide-spread if often scanty pasture, and there are not a few river-fed oases in it, but it is wholly unpenetrated by waterways from the ocean. In other words, we have in this immense area all the conditions for the maintenance of a sparse, but in the aggregate considerable, population of horse-riding and camel-riding nomads. Their realm is limited northward by a broad belt of sub-arctic forest and marsh, wherein the climate is too rigorous, except at the eastern and western extremities, for the development of agricultural settlements. In the east the forests extend southward to the Pacific coast in the Amur

land and Manchuria. Similarly in the west, in prehistoric Europe, forest was the predominant vegetation. Thus framed in to the north-east, north, and north-west, the steppes spread continuously for 4000 miles from the Pushtas of Hungary to the Little Gobi of Manchuria, and, except in their westernmost extremity, they are untraversed by rivers draining to an accessible ocean, for we may neglect the very recent efforts to trade to the mouths of the Obi and Yenisei. In Europe, Western Siberia, and Western Turkestan the steppe lands lie low, in some places below the level of the sea. Further to east, in Mongolia, they extend over plateaux; but the passage from the one level to the other, over the naked, unscarped lower ranges of the arid heart-land, presents little difficulty.

The hordes which ultimately fell upon Europe in the middle of the fourteenth century gathered their first force 3000 miles away on the high steppes of Mongolia. The havoc wrought for a few years in Poland, Silesia, Moravia, Hungary, Croatia, and Servia was, however, but the remotest and the most transient result of the great stirring of the nomads of the East associated with the name of Ghenghiz Khan. While the Golden Horde occupied the steppe of Kipchak, from the Sea of Aral, through the interval between the Ural range and the Caspian, to the foot of the Carpathians, another horde, descending south-westward between the Caspian sea and the Hindu Kush into Persia, Mesopotamia, and even into Syria, founded the domain of the Ilkhan. A third subsequently struck into Northern China, conquering Cathay. India and Mangi, or Southern China, were for a time sheltered by the incomparable barrier of Tibet, to whose efficacy there is, perhaps, nothing similar in the world, unless it be the Sahara desert and the polar ice. But at a later time, in the days of Marco Polo in the case of Mangi, in those of Tamerlane in the case of India, the obstacle was circumvented. Thus it happened that in this typical and well-recorded instance, all the settled margins of the Old World sooner or later felt the expansive force of mobile power originating in the steppe. Russia, Persia, India, and China were either made tributary, or received Mongol dynasties. Even the incipient power of the Turks in Asia Minor was struck down for half a century.

As in the case of Europe, so in other marginal lands of Euro-Asia there are records of earlier invasions. China had more than once to submit to conquest from the north; India several times to conquest from the north-west. In the case of Persia, however, at least one of the earlier descents has a special significance in the history of Western civilization. Three or four centuries before the Mongols, the Seljuk Turks, emerging from Central Asia, overran by this path an immense area of the land, which we may describe as of the five seas—Caspian, Black, Mediterranean, Red, and Persian. They established themselves at Kerman, at Hamadan, and in Asia Minor, and they overthrew the

Saracen dominion of Bagdad and Damascus. It was ostensibly to punish their treatment of the Christian pilgrims at Jerusalem that Christendom undertook the great series of campaigns known collectively as the Crusades. Although these failed in their immediate objects, they so stirred and united Europe that we may count them as the beginning of modern history—another striking instance of European advance stimulated by the necessity of reacting against pressure from the heart of Asia.

The conception of Euro-Asia to which we thus attain is that of a continuous land, ice-girt in the north, water-girt elsewhere, measuring 21 million square miles, or more than three times the area of North America, whose centre and north, measuring some 9 million square miles, or more than twice the area of Europe, have no available water-ways to the ocean, but, on the other hand, except in the subarctic forest, are very generally favourable to the mobility of horsemen and camelmen. To east, south, and west of this heart-land are marginal regions, ranged in a vast crescent, accessible to shipmen. According to physical conformation, these regions are four in number, and it is not a little remarkable that in a general way they respectively coincide with the spheres of the four great religions—Buddhism, Brahminism, Mahometanism, and Christianity. The first two are the monsoon lands, turned the one towards the Pacific, and the other towards the Indian ocean. The fourth is Europe, watered by the Atlantic rains from the west. These three together, measuring less than 7 million square miles, have more than 1000 million people, or two-thirds of the world population. The third, coinciding with the land of the Five Seas, or, as it is more often described, the Nearer East, is in large measure deprived of moisture by the proximity of Africa, and, except in the oases, is therefore thinly peopled. In some degree it partakes of the characteristics both of the marginal belt and of the central area of Euro-Asia. It is mainly devoid of forest, is patched with desert, and is therefore suitable for the operations of the nomad. Dominantly, however, it is marginal, for sea-gulfs and oceanic rivers lay it open to sea-power, and permit of the exercise of such power from it. As a consequence, periodically throughout history, we have here had empires belonging essentially to the marginal series, based on the agricultural populations of the great oases of Babylonia and Egypt, and in free water-communication with the civilized worlds of the Mediterranean and the Indies. But, as we should expect, these empires have been subject to an unparalleled series of revolutions, some due to Scythian, Turkish, and Mongol raids from Central Asia, others to the effort of the Mediterranean peoples to conquer the overland ways from the western to the eastern ocean. Here is the weakest spot in the girdle of early civilizations, for the isthmus of Suez divided sea-power into Eastern and Western, and the arid wastes of Persia advancing from Central Asia to the Persian gulf gave constant opportunity for

nomad-power to strike home to the ocean edge, dividing India and China, on the one hand, from the Mediterranean world on the other. Whenever the Babylonian, the Syrian, and the Egyptian oases were weakly held, the steppe-peoples could treat the open tablelands of Iran and Asia Minor as forward posts whence to strike through the Punjab into India, through Syria into Egypt, and over the broken bridge of the Bosphorus and Dardanelles into Hungary. Vienna stood in the gateway of Inner Europe, withstanding the nomadic raids, both those which came by the direct road through the Russian steppe, and those which came by the loop way to south of the Black and Caspian seas.

Here we have illustrated the essential difference between the Saracen and the Turkish controls of the Nearer East. The Saracens were a branch of the Semitic race, essentially peoples of the Euphrates and Nile and of the smaller oases of Lower Asia. They created a great empire by availing themselves of the two mobilities permitted by their land—that of the horse and camel on the one hand, that of the ship on the other. At different times their fleets controlled both the Mediterranean as far as Spain, and the Indian ocean to the Malay islands. From their strategically central position between the eastern and western oceans, they attempted the conquest of all the marginal lands of the Old World, imitating Alexander and anticipating Napoleon. They could even threaten the steppe land. Wholly distinct from Arabia as from Europe, India, and China were the Turanian pagans from the closed heart of Asia, the Turks who destroyed the Saracen civilization.

Mobility upon the ocean is the natural rival of horse and camel mobility in the heart of the continent. It was upon navigation of oceanic rivers that was based the Potamic stage of civilization, that of China on the Yangtse, that of India on the Ganges, that of Babylonia on the Euphrates, that of Egypt on the Nile. It was essentially upon the navigation of the Mediterranean that was based what has been described as the Thalassic stage of civilization, that of the Greeks and Romans. The Saracens and the Vikings held sway by navigation of the oceanic coasts.

The all-important result of the discovery of the Cape road to the Indies was to connect the western and eastern coastal navigations of Euro-Asia, even though by a circuitous route, and thus in some measure to neutralize the strategical advantage of the central position of the steppe-nomads by pressing upon them in rear. The revolution commenced by the great mariners of the Columbian generation endowed Christendom with the widest possible mobility of power, short of a winged mobility. The one and continuous ocean enveloping the divided and insular lands is, of course, the geographical condition of ultimate unity in the command of the sea, and of the whole theory of modern naval strategy and policy

as expounded by such writers as Captain Mahan and Mr. Spencer Wilkinson. The broad political effect was to reverse the relations of Europe and Asia, for whereas in the Middle Ages Europe was caged between an impassable desert to south, an unknown ocean to west, and icy or forested wastes to north and north-east, and in the east and south-east was constantly threatened by the superior mobility of the horsemen and camelmen, she now emerged upon the world, multiplying more than thirty-fold the sea surface and coastal lands to which she had access, and wrapping her influence round the Euro-Asiatic land-power which had hitherto threatened her very existence. New Europes were created in the vacant lands discovered in the midst of the waters, and what Britain and Scandinavia were to Europe in the earlier time, that have America and Australia, and in some measure even Trans-Saharan Africa, now become to Euro-Asia. Britain, Canada, the United States, South Africa, Australia, and Japan are now a ring of outer and insular bases for sea-power and commerce, inaccessible to the land-power of Euro-Asia.

But the land power still remains, and recent events have again increased its significance. While the maritime peoples of Western Europe have covered the ocean with their fleets, settled the outer continents, and in varying degree made tributary the oceanic margins of Asia, Russia has organized the Cossacks, and, emerging from her northern forests, has policed the steppe by setting her own nomads to meet the Tartar nomads. The Tudor century, which saw the expansion of Western Europe over the sea, also saw Russian power carried from Moscow through Siberia. The eastward swoop of the horsemen across Asia was an event almost as pregnant with political consequences as was the rounding of the Cape, although the two movements long remained apart.

It is probably one of the most striking coincidences of history that the seaward and the landward expansion of Europe should, in a sense, continue the ancient opposition between Roman and Greek. Few great failures have had more far-reaching consequences than the failure of Rome to Latinize the Greek. The Teuton was civilized and Christianized by the Roman, the Slav in the main by the Greek. It is the Romano-Teuton who in later times embarked upon the ocean; it was the Graeco-Slav who rode over the steppes, conquering the Turanian. Thus the modern land-power differs from the sea-power no less in the source of its ideals than in the material conditions of its mobility.\*

In the wake of the Cossack, Russia has safely emerged from her former seclusion in the northern forests. Perhaps the change of greatest

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\* This statement was criticized in the discussion which followed the reading of the paper. On reconsidering the paragraph, I still think it substantially correct. Even the Byzantine Greek would have been other than he was had Rome completed the subjugation of the ancient Greek. No doubt the ideals spoken of were Byzantine rather than Hellenic, but they were not Roman, which is the point.

intrinsic importance which took place in Europe in the last century was the southward migration of the Russian peasants, so that, whereas agricultural settlements formerly ended at the forest boundary, the centre of the population of all European Russia now lies to south of that boundary, in the midst of the wheat-fields which have replaced the more western steppes. Odessa has here risen to importance with the rapidity of an American city.

A generation ago steam and the Suez canal appeared to have increased the mobility of sea-power relatively to land-power. Railways acted chiefly as feeders to ocean-going commerce. But trans-continental railways are now transmuting the conditions of land-power, and nowhere can they have such effect as in the closed heart-land of Euro-Asia, in vast areas of which neither timber nor accessible stone was available for road-making. Railways work the greater wonders in the steppe, because they directly replace horse and camel mobility, the road stage of development having here been omitted.

In the matter of commerce it must not be forgotten that ocean-going traffic, however relatively cheap, usually involves the fourfold handling of goods—at the factory of origin, at the export wharf, at the import wharf, and at the inland warehouse for retail distribution; whereas the continental railway truck may run direct from the exporting factory into the importing warehouse. Thus marginal ocean-fed commerce tends, other things being equal, to form a zone of penetration round the continents, whose inner limit is roughly marked by the line along which the cost of four handlings, the oceanic freight, and the railway freight from the neighbouring coast, is equivalent to the cost of two handlings and the continental railway freight. English and German coals are said to compete on such terms midway through Lombardy.

The Russian railways have a clear run of 6000 miles from Wirballen in the west to Vladivostok in the east. The Russian army in Manchuria is as significant evidence of mobile land-power as the British army in South Africa was of sea-power. True, that the Trans-Siberian railway is still a single and precarious line of communication, but the century will not be old before all Asia is covered with railways. The spaces within the Russian Empire and Mongolia are so vast, and their potentialities in population, wheat, cotton, fuel, and metals so incalculably great, that it is inevitable that a vast economic world, more or less apart, will there develop inaccessible to oceanic commerce.

As we consider this rapid review of the broader currents of history, does not a certain persistence of geographical relationship become evident? Is not the pivot region of the world's politics that vast area of Euro-Asia which is inaccessible to ships, but in antiquity lay open to the horse-riding nomads, and is to-day about to be covered with a network of railways? There have been and are here the conditions of a mobility of military and economic power of a far-reaching and yet



limited character. Russia replaces the Mongol Empire. Her pressure on Finland, on Scandinavia, on Poland, on Turkey, on Persia, on India, and on China, replaces the centrifugal raids of the steppemen. In the world at large she occupies the central strategical position held by Germany in Europe. She can strike on all sides and be struck from all sides, save the north. The full development of her modern railway mobility is merely a matter of time. Nor is it likely that any possible social revolution will alter her essential relations to the great geographical limits of her existence. Wisely recognizing the fundamental limits of her power, her rulers have parted with Alaska; for it is as much a law of policy for Russia to own nothing over seas as for Britain to be supreme on the ocean.

Outside the pivot area, in a great inner crescent, are Germany, Austria, Turkey, India, and China, and in an outer crescent, Britain, South Africa, Australia, the United States, Canada, and Japan. In the present condition of the balance of power, the pivot state, Russia, is not equivalent to the peripheral states, and there is room for an equipoise in France. The United States has recently become an eastern power, affecting the European balance not directly, but through Russia, and she will construct the Panama canal to make her Mississippi and Atlantic resources available in the Pacific. From this point of view the real divide between east and west is to be found in the Atlantic ocean.

The oversetting of the balance of power in favour of the pivot state, resulting in its expansion over the marginal lands of Euro-Asia, would permit of the use of vast continental resources for fleet-building, and the empire of the world would then be in sight. This might happen if Germany were to ally herself with Russia. The threat of such an event should, therefore, throw France into alliance with the over-sea powers, and France, Italy, Egypt, India, and Corea would become so many bridge heads where the outside navies would support armies to compel the pivot allies to deploy land forces and prevent them from concentrating their whole strength on fleets. On a smaller scale that was what Wellington accomplished from his sea-base at Torres Vedras in the Peninsular War. May not this in the end prove to be the strategical function of India in the British Imperial system? Is not this the idea underlying Mr. Amery's conception that the British military front stretches from the Cape through India to Japan?

The development of the vast potentialities of South America might have a decisive influence upon the system. They might strengthen the United States, or, on the other hand, if Germany were to challenge the Monroe doctrine successfully, they might detach Berlin from what I may perhaps describe as a pivot policy. The particular combinations of power brought into balance are not material; my contention is that from a geographical point of view they are likely to rotate round the



pivot state, which is always likely to be great, but with limited mobility as compared with the surrounding marginal and insular powers.

I have spoken as a geographer. The actual balance of political power at any given time is, of course, the product, on the one hand, of geographical conditions, both economic and strategic, and, on the other hand, of the relative number, virility, equipment, and organization of the competing peoples. In proportion as these quantities are accurately estimated are we likely to adjust differences without the crude resort to arms. And the geographical quantities in the calculation are more measurable and more nearly constant than the human. Hence we should expect to find our formula apply equally to past history and to present politics. The social movements of all times have played around essentially the same physical features, for I doubt whether the progressive desiccation of Asia and Africa, even if proved, has in historical times vitally altered the human environment. The westward march of empire appears to me to have been a short rotation of marginal power round the south-western and western edge of the pivotal area. The Nearer, Middle, and Far Eastern questions relate to the unstable equilibrium of inner and outer powers in those parts of the marginal crescent where local power is, at present, more or less negligible.

In conclusion, it may be well expressly to point out that the substitution of some new control of the inland area for that of Russia would not tend to reduce the geographical significance of the pivot position. Were the Chinese, for instance, organized by the Japanese, to overthrow the Russian Empire and conquer its territory, they might constitute the yellow peril to the world's freedom just because they would add an oceanic frontage to the resources of the great continent, an advantage as yet denied to the Russian tenant of the pivot region.

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Before the reading of the paper, the PRESIDENT said: We are always very glad when we can induce our friend Mr. Mackinder to address us on any subject, because all he says to us is sure to be interesting and original and valuable. There is no necessity for me to introduce so old a friend of the Society to the meeting, and I will therefore at once ask him to read his paper.

After the reading of the paper, the PRESIDENT said: We hope that Mr. Spencer Wilkinson will offer some criticism on Mr. Mackinder's paper. Of course, it will not be possible to avoid geographical politics to a certain extent.

MR. SPENCER WILKINSON: It would occur to me that the most natural thing and the most sincere thing to say at the beginning is to endeavour to express the great gratitude which, I am sure, every one here feels for one of the most stimulating papers that has been read for a long time. As I was listening to the paper, I looked with regret on some of the space that is unoccupied here, and I much regret that a portion of it was not occupied by the members of the Cabinet, for I gathered that in Mr. Mackinder's paper we have two main doctrines laid down: the first, which is not altogether new—I think it was foreseen some years back in the last century—that since the modern improvements of steam navigation the whole of the world has become one, and has become one political system. I forget the

exact expression that Mr. Mackinder used ; I think he said that the difference was something like that of a shell falling into an enclosed structure and falling into space. I should wish to express the same thing by saying that, whereas only half a century ago statesmen played on a few squares of a chess-board of which the remainder was vacant, in the present day the world is an enclosed chess-board, and every movement of the statesman must take account of all the squares in it. I myself can only wish that we had ministers who would give more time to studying their policy from the point of view that you cannot move any one piece without considering all the squares on the board. We are very much too apt to look at our policy as though it were cut up into water-tight compartments, each of which had no connection with the rest of the world, whereas it seems to me the great fact of to-day is that any movement which is made in one part of the world affects the whole of the international relations of the world—a fact which, it seems to me, is lamentably neglected both in British policy and in most of the popular discussions of it, and I am exceedingly grateful to Mr. Mackinder for having laid so much stress on that in his paper. Then the other point—the main point, I take it, which he has brought out is really as to the enormous importance to the world of the modern expansion of Russia. I cannot say that I am thoroughly convinced of some of Mr. Mackinder's historical analogies or precedents, unless, indeed, we are to take his paper as carrying us a very long way ahead. Mr. Mackinder takes us back over four hundred years, and talks of the Columbian epoch. Well, I cannot pretend to be able to go four hundred years forward ; if one can go a generation forward, it is quite as much as some of us can manage. Now, these great movements of Central Asian tribes on to Europe and on to the different marginal countries may, I think, be over-estimated in their importance. They have left occasional survivals of the past, but they have not left the world much richer in ideas, and very seldom represented any permanent alterations in the conditions of mankind ; and they have been possible because the expanding forces of Central Asia hit upon a very much divided margin. For instance, the movement of the Ottoman Turks, and before that the Turkish movements upon the Byzantine Empire and upon the region that had been the Byzantine Empire, invariably struck upon regions in which government was in decay or obsolescent, and most of the movements which struck upon Central Europe, the movements north of the Black sea, struck upon Europe at a time when government was very little organized, and when the states had very little of solidarity between them. Therefore, I hold they do not afford very much parallel for the future ; and I should be disposed to dwell on the counterbalancing phenomenon, which is that you have had in the west of Europe a small island, which, having attained to its own political unity, and having in the conflict for its own independence developed its sea-power, has been able to affect the marginal regions and to acquire the enormous influence which was revealed to us, a little exaggerated, perhaps, on the map which Mr. Mackinder showed—the British Empire—exaggerated because it was a map on Mercator's projection, which exaggerated the British Empire, with the exception of India. My own belief is that an island state like our own can, if it maintains its naval power, hold the balance between the divided forces which work on the continental area, and I believe that has been the historical function of Great Britain since Great Britain was a United Kingdom. Now we find a smaller island state rising on the opposite side of the Euro-Asian continent, and I see no reason at all to suppose that that state should not be able to exercise on the eastern fringe of the Asiatic continent a power as decisive and as influential as that which the British Isles, with a smaller population, have exercised upon Europe.

Sir THOMAS HOLDICH: When one hears a lecture such as Mr. Mackinder has just given us, so full of thought and so thoroughly well worked out, with such an amount of food for reflection contained in it, it takes a great deal of moral digestion to assimilate it, and more assurance than I possess either to criticize it, or even to discuss it. But there is just one question I should like to ask Mr. Mackinder, and in co-relating the facts of geographical conditions with the history of the human race, it seems to me a not unimportant one. Mr. Mackinder has told us that in the beginning of things the Mongol races all started from a centre in high Asia, spreading outwards, westwards, southwards, and eastwards, finding, however, Tibet an impossible barrier in their way, and never exactly occupying India. But we must remember that before the Mongolians spread, there were other Central Asian tribes who spread equally from districts which were not so very far removed from the position which the Mongolians themselves first occupied—the Scyths and the Aryans—and that they did find their way into India. That, however, is a matter of detail. What I should like to know from Mr. Mackinder is, what he considers to be the original reason of that extraordinary overflow from the country which we are disposed to consider to be the cradle of the human race, to all the different parts of the world. Was it simply the nomadic instincts of the people, a sort of hereditary compulsion which obliged them to flow outwards; or was it an actual alteration in the physical characteristics of the country in which they dwelt? We know that the physical conditions of the world alter very much from time to time, and it seems to me impossible to reconcile the idea of a great inland country, which must once have been full of a teeming population, and have supported that population, as you may say, with an abundant power of agricultural wealth—that under such conditions a people should have had a desire to spread out and to wander forth into other parts of the world, seeking for they knew not what. I fancy, myself, that one of the great reasons, one of the great compelling reasons, for all these migrations really has been a distinct alteration in the physical condition of the country. That is a point which seems to me to be rather important when we are discussing a subject like the present one, which brings the conditions of geography to bear on the facts of history. There is just one other little matter which was referred to somewhat doubtfully by Mr. Mackinder to which I might refer. He pointed to South America as a possible factor in that outer belt of power which was to bring coercion to bear on the inner power pivoting about the south of Russia. Now, from what I have seen lately, I have not the least doubt that that will be the case. The potentiality of South America as a naval power I look upon as very great. I believe that in the course, say, of the next half-century, in spite of the fact that just now Argentina has sold two ships to Japan, and Chili has sold a couple of ships to us—in spite of that fact, there will be an increase of naval strength in South America, resulting from purely natural causes, for the defence of her own coast and the protection of her own traffic, which will be only comparable to the extraordinary development which we have seen during the last half-century in Japan. This seems to me certainly to be one of the factors, if we are to look forward, with which, in the future naval politics of the world, we shall have to reckon.

Mr. AMERY: I think it is always enormously interesting if we can occasionally get away from the details of everyday politics and try to see things as a whole, and this is what Mr. Mackinder's most stimulating lecture has done for us to-night. He has given us the whole of history and the whole of ordinary politics under one big comprehensive idea. I remember when I did Herodotus at the university, he made the whole of history base itself upon the great struggle between the east and the west. Mr. Mackinder makes the whole of history and politics

base themselves on the great economical struggle between the great inside core of the Euro-Asiatic continent and the smaller marginal regions and islands outside. I am not sure myself that these two struggles are not one and the same, because now we have discovered that the world is a sphere, east and west have only become relative terms. I would criticize one thing Mr. Mackinder said when he described Russia as the heir of Greece. It was not the ancient heir of Hellenic Greece, but of Byzantium, and Byzantium was the heir of the old Oriental monarchies with the Greek language and a tinge of Roman civilization thrown over it. I should like to go back, if I might, for a moment to this geographical economic foundation on which Mr. Mackinder built the framework of his lecture. I think I would conceive the thing somewhat differently. There are, to my mind, not two, but three economico-military forces. If we begin with the ancient world, you have the broad geographical division into the "steppes" of the interior, the rich marginal land suitable for agriculture, and the coast, and you have corresponding with these, three economical and three military systems. There is the economical and military system of the agricultural country, the system of the coast and sea-faring people, and the system of the steppes; each had its peculiar weaknesses and its peculiar sources of strength. The strongest in many ways was the marginal and agricultural state. There you got the great solid military Empires, your Egyptian, your Babylonian, your Roman Empire, your large armies and citizen infantry, your great development of wealth. But these contained certain elements of weakness. Their own prosperity or the defects of their form of government would lead ultimately to slothfulness and weakness. Now, outside those you had two other systems. You had the steppe system, whose military strength lay, firstly, in its mobility, and, secondly, in its inaccessibility to the slower-moving agricultural powers. As regards the supposed "hordes" of invaders which came from the interior, I do not myself believe there ever were those very large hordes and large populations in the interior. The fact is this, the steppe populations were small then as now, but from the fact of their mobility the heavier and slower military armies could not successfully attack them. In ordinary times, when the agricultural states were strong, the people of the steppes simply ran away from them, and the others found it too much trouble to conquer them. You remember the difficulty the Roman legions had with the Parthians; and I think we can find a very much more recent example of the difficulty a civilized state finds in conquering a steppe-power. Only a short time ago, the whole of the British army was occupied in trying to coerce some 40,000 or 50,000 farmers who lived on a dry steppe-land. That photograph Mr. Mackinder was showing reminded me exactly of what you could have seen not so many months ago in South Africa—I mean, that picture of waggons crossing the river was, except for the shape of the roof over the waggon, exactly like a picture of a Boer commando crossing a drift. We had the same difficulty in coercing them that all civilized powers have had with steppe people. Now, whenever the civilized powers on the marginal countries have grown weak and have allowed small hired armies to do their work, they have got into difficulties, and that is where, it seems to me, the strength of the steppes has always come in. There is no great economic strength at bottom, but the fact that they could retire into their inaccessible wilderness, and come upon the others in times of their weakness, gave the steppe peoples their power. Then there is the third system, that of the maritime coast peoples: they had even less pure military strength, but they had the greatest mobility—the mobility, I mean, of the Vikings or the Saracens when they ruled the Mediterranean, and the Elizabethan Englishmen when they harried the Spanish Main. Coming to more modern times, there has been a certain further change in the agricultural

conditions, and the development, out of the old agricultural states, of the modern industrial state. Then I would also notice that many countries which were steppe became agricultural and industrial. You have that, and you have also the fact that very rarely in history do you get any state rising to great power by one system alone. The Turks began by being the people of the steppes, and came down and swept over Asia Minor; they then formed a regular military power, and conquered the great Turkish Empire; lastly, for a period they became the leading naval power in the Mediterranean. In the same way, you find the Romans, in order to beat the Carthaginians, became a sea-power as well as a land-power; and, in fact, for a power to be great it must have both these elements of strength. The Romans were a great military power with the marginal region as their base and with sea-power behind them. We ourselves have always had as a base the industrial wealth of England. The Russian Empire, which covers the great steppe region, but is no longer in the hands of the old steppe people, is really a portion of the agricultural world, economically, which has conquered the steppe and is turning it into a great agricultural industrial power, and therefore giving a power which the pure steppe people never possessed. Mr. Mackinder referred to the fact that it is only within the last century that the agricultural races have occupied and populated the southern steppe of Russia proper. They are doing the same thing in Central Asia; in fact, the old steppe people are being squeezed out altogether, and you get, coming closer and closer together, two leading industrial-military powers, the one radiating out from a continental centre, and the other beginning from the sea, but gradually going further into the continent in order to have the big industrial base which it requires, because sea-power alone, if it is not based on great industry, and has a great population behind it, is too weak for offence to really maintain itself in the world struggle. I do not intend to make many more remarks, but there is just one point—a word of Mr. Mackinder's suggested it to me. Horse and camel mobility has largely passed away; and it is now a question of railway-mobility as against sea-mobility. I should like to say that sea-mobility has gained enormously in military strength to what it was in ancient times, especially in the number of men that can be carried. In the old days the ships were mobile enough, but they carried few men, and the raids of the sea-people were comparatively feeble. I am not suggesting anything political at the present time; I am merely stating a fact when I say that the sea is far better for conveying troops than anything, except fifteen or twenty parallel lines of railway. What I was coming to is this: that both the sea and the railway are going in the future—it may be near, or it may be somewhat remote—to be supplemented by the air as a means of locomotion, and when we come to that (as we are talking in broad Columbian epochs, I think I may be allowed to look forward a bit)—when we come to that, a great deal of this geographical distribution must lose its importance, and the successful powers will be those who have the greatest industrial basis. It will not matter whether they are in the centre of a continent or on an island; those people who have the industrial power and the power of invention and of science will be able to defeat all others. I will leave that as a parting suggestion.

Mr. HOGARTH: As the hour is rather late and the temperature rather low, I will not take up your time with any very lengthy remarks. We certainly have had a wonderfully suggestive paper, and I think it is neither necessary to advise the reader of the paper nor any one who has listened to it to try and think imperially. I would only ask Mr. Mackinder, when he replies, to make me certain about one point. Does he really mean to imply—I think it is an interesting fact if he meant to establish it—that the state of things which is coming

to pass in this inner pivot land will be entirely different to anything that has been seen there before? That is to say, something like a stationary state of things has been brought about, and the country is being developed, till it will even be able to export its own products to the rest of the world; and therefore we are never to see again the state of things that has existed all through ancient history in that a great central region which has continually sent its populations down into the marginal countries, while the marginal countries have sent back to it their influences of civilization, each operating in turn upon the other. The only other observation I would like to make is to reinforce Mr. Amery's objection to Mr. Mackinder's Græco-Slav. I am afraid I cannot accept that division of civilization between the Greek and the Roman. So far as Russia can be called a civilized country at this moment, it has, I think, not been civilized by the Orthodox Church; in fact, I have yet to learn of any civilizing influence exerted by the Orthodox Church on a great scale. Its civilization is far more due to the social culture which was introduced by Peter the Great, and that was more Roman than Greek. But it is to my first question I should like Mr. Mackinder to give a clear answer. I should like to know what he seriously anticipates is going to be the effect on the world of this new distinction between the marginal and the central pivot lands.

MR. MACKINDER: I have to thank all the speakers for dotting my *i's* and crossing my *t's*. I am delighted to find my formula work so well. I do mean exactly what Mr. Hogarth says; I mean that for the first time within recorded history—and this is in reply to Sir Thomas Holdich as well—you have a great stationary population being developed in the steppe lands. This is a revolution in the world that we have to face and reckon with. I doubt very much, and there I agree with Mr. Amery, whether the numbers who came from the heart of Asia were very great. It seems to me quite as he puts it, and that their mobility was of the very essence of the whole thing. A small number of people coming from the steppe lands could do many things, given relative mobility as compared with the agricultural population. With regard to Sir Thomas Holdich's inquiry as to what should send them forth, Sir Clements Markham has pointed out that the nomads did not pour forth once only. I dealt with the fact that for a thousand years the nomadic peoples came through Russia. I fail to see that, when you have this constant succession of descents upon the marginal lands, you are called upon to ask for any special physical change to explain it. All the accounts we have from the time of the earliest Greeks describe the drinkers of mares' milk, and picture for us the nomadic mode of life; therefore I start with the fact that these peoples were nomadic and remained nomadic through two thousand years, and I do not see any evidence that we need either to call in any great physical change or yet to assume any great settled population. As far as I can see, Sven Hedin refuses the idea that you must necessarily ask for a great change of climate in order to explain the existence of the remains in Central Asia. You have powerful winds and much sand, and from time to time the sand is swept over hundreds of miles across the desert. The sand determines the flow of the rivers and the position of the lakes, and some great storm diverting a river into another course would no doubt suffice to ruin a town abandoned by the water. The mere fact that there were nomads, and that there were rich countries to be plundered, seems to me to be almost sufficient for my theory. In the future, I think, you are bound to have different economic provinces, one based mainly on the sea, and the other on the heart of the continent and on railways. I do not think Mr. Amery has allowed sufficiently for the fact that the very largest armies cannot be moved by means of a navy. The Germans marched nearly a million men into France; they marched, and used the railways for supplies. Russia, by

her tariff system and in other ways, is steadily hastening the accomplishment of what I may call the non-oceanic economic system. Her whole policy, by her tariff system, by her break of gauge on her railways, is to separate herself from external oceanic competition.\* With regard to the basis of sea-power in industrial wealth, I absolutely agree. What I suggest is that great industrial wealth in Siberia and European Russia and a conquest of some of the marginal regions would give the basis for a fleet necessary to found the world empire. Mr. Amery's way of putting the three groups of powers is slightly different from mine, but it is essentially the same. I ask for an inner land mobility, for a margin densely populated, and for external sea forces. It is true the camel-men and the horse-men are going; but my suggestion is that railways will take their place, and then you will be able to fling power from side to side of this area. My aim is not to predict a great future for this or that country, but to make a geographical formula into which you could fit any political balance.

There was a point with regard to the Græco-Slav: in the sense in which Mr. Hogarth and Mr. Amery have taken me, I agree with them, but after all I cannot help feeling that Christianity fell on two very different soils—the Greek philosophic and the Roman legal, and that it has in consequence differently influenced the Slav and the Teuton. However, that is a mere incident, and if I qualify my statement by speaking of the Byzantine, I shall then get near to what Mr. Amery asks, and I think I shall do away with the necessity of introducing the example of Rome which Mr. Hogarth brought forward. As regards the potentialities of the land and of the people, I would point out that in Europe there are now more than 40,000,000 people in the steppe land of Russia, and it is by no means yet densely occupied, and that the Russian population is probably increasing faster than any other great civilized or half-civilized population in the world. With a decreasing French population, and a British not increasing as fast as it was, and the native-born populations of the United States and Australia coming nearly to a standstill, you have to face the fact that in a hundred years 40,000,000 people have occupied but a mere corner of the steppe. I think you are on the way to a population which will be numbered by the hundred million; and this is a tendency which you must take into account in assigning values to the variable quantities in the equation of power for which I was seeking a geographical formula. The point with regard to Korea and the Persian gulf which was put by Mr. Spencer Wilkinson exactly illustrates my correlation of the Far Eastern, Middle Eastern, and Near Eastern questions. I represent these as being the present temporary form of the collision between the external and internal forces acting through the intermediate zone, which is itself the seat of independent forces. I quite agree that the function of Britain and of Japan is to act upon the marginal region, maintaining the balance of power there as against the expansive internal forces. I believe that the future of the world depends on the maintenance of this balance of power. It appears to me that our formula makes it clear that we must see to it that we are not driven out of the marginal region. We must maintain our position there, and then, whatever happens, we are fairly secure. The increase of population in the inner regions and the stoppage of increase in the outer regions may be rather serious; but perhaps South America will come in to help us.

The PRESIDENT: I confess I have been entranced by Mr. Mackinder's paper, and I could see by the close attention with which it was listened to by the audience

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\* The Russian customs ring is, of course, so placed as to add to the pivotal area for economic purposes considerable sections of the marginal lands, although not of the oceanic coasts.—H. J. M.

that you all shared my feeling in that respect. Mr. Mackinder has dealt with the old, old story from the very dawn of history, the struggle between Ormerzd and Ahri-man, and he has shown us how that struggle has continued on from the very dawn of history to the present day. He has explained all this to us with a brilliancy of description and of illustration, with a close grasp of the subject, and with a clearness of argument which we have seldom had equalled in this room. I am sure you will all with me give a unanimous vote of thanks to Mr. Mackinder for his most interesting paper this evening.

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## BATHYMETRICAL SURVEY OF THE FRESH-WATER LOCHS OF SCOTLAND.\*

Under the Direction of Sir JOHN MURRAY, K.C.B., F.R.S., D.Sc., etc., and  
LAURENCE PULLAR, F.R.S.E.

### PART IV.—LOCHS OF THE ASSYNT DISTRICT.

In this paper it is proposed to deal with the results of the work of the Lake Survey among the lochs in the Assynt district of Sutherlandshire, viz. (1) Lochs Assynt, Leitir Easaich, Awe, Maol a' Choire, Bean-nach, Druim Suardalain, and na Doire Daraich, which drain into Loch Inver; (2) Lochs Cròcach and an Tuirc, which drain into Loch Roe; (3) Lochs Borralan, Urigill, Càrn, Veyatie, a' Mhiotailt, and Fionn, which drain into Loch Kirkaig; (4) Lochs Skinaskink, Gainmheich, and (5) Lurgain, Bad a' Ghail, and Owskeich, which drain into Enard bay. The relative positions of these lochs will be seen at a glance in the index map shown in Fig. 1. Some notes on these lochs drawn up by Mr. Garrett before leaving for Borneo have been made use of in preparing the descriptions.

#### INTRODUCTORY.

The bathymetrical and other details regarding the lochs dealt with in this paper are collected together in the table on p. 446 for convenience of reference and comparison. These details are not repeated in the text, but other particulars are given under the name of each loch. Where the elevation above the sea was not determined by levelling from bench-mark, the approximate elevation is given in brackets; in the case of Lochs Urigill, Càrn, Lurgain, and Owskeich, the Ordnance Survey level is given, with an indication of the date when levelled.

From this table it will be seen that in the twenty lochs under consideration 2540 soundings were taken, and that the aggregate area of the water-surface is over  $12\frac{1}{2}$  square miles, so that the average number

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\* Continued from vol. xxiii. p. 61. Maps, p. 548. The maps illustrating this paper are reduced from the 6-inch Ordnance Survey charts, and are published by permission of the Controller of H.M. Stationery Office.



